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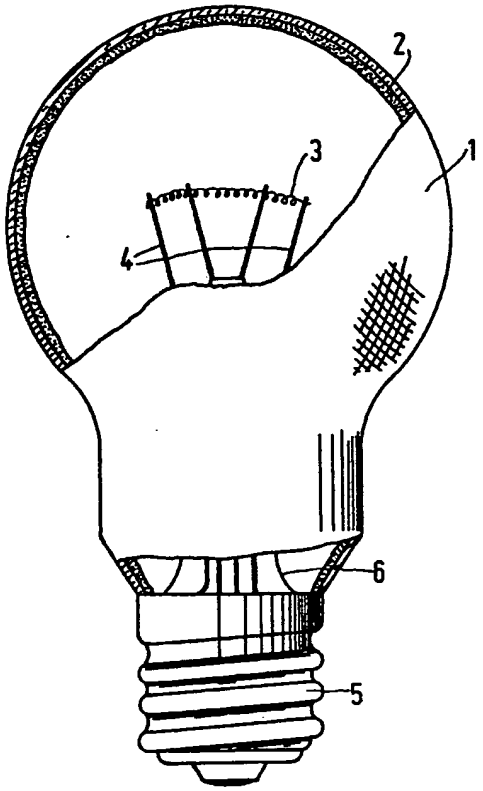
(54) Electric lamp having a coloured lamp vessel.

(57) An electric lamp having an electrostatically applied powder layer (2) on the wall of the lamp vessel (1) according to the invention contains MgO as an addition to this powder layer. The addition prevents discolouring of Cd-containing pigments in the powder layer and in the case of incandescent lamps results in lengthening of the life.



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"Electric lamp having a coloured lamp vessel".

The invention relates to an electric lamp having a glass lamp vessel which is sealed in a gastight manner and in which a light source is arranged, which is connected to current supply conductors, which are passed through the wall of the lamp vessel to the outside, this lamp vessel having on its inner surface an electrostatically applied powder layer which comprises a light-scattering powder. Such a lamp is known from European Patent Application 0116994 - (PHN 10.593).

An electrostatically applied powder layer is distinguished from a powder layer formed from a suspension. The former kind of layer has a very low packing density, which may even be fifty times lower than that of a layer formed from a suspension having the same powder composition. The surface of the layer has a remarkable roughness as compared with the smooth surface of a layer formed from a suspension, when applied to a transparent non-frosted lamp vessel, an electrostatically applied layer shows clearly, when looking at the lamp vessel along a tangent line to this lamp vessel, that the wall of the lamp vessel has a certain thickness. This is not the case with a lamp vessel with a coating obtained from a suspension.

The method of coating a lamp vessel electrostatically affords the advantage that no organic solvents and binders are introduced into the lamp vessel, which have to be removed therefrom. However, it has been found to be disadvantageous that an electrostatically applied layer contains moisture, which is released gradually therefrom only during the operation of the lamp and adversely affects the quality of the lamp. The moisture may lead to the lamp vessel becoming leaky and in incandescent lamps may involve an accelerated transport of tungsten from the filament to the wall of the lamp vessel. It has further been found that electrostatically applied layers containing a cadmium pigment exhibit a discolouring at areas at which they are strongly heated during the manufacture of the lamp. In a lamp in which the lamp vessel is fused at one end to a tube (stem tube) which tapers and projects into the lamp vessel, this discolouring occurs near this areas of the fusion of lamp vessel to stem tube.

The invention has for its object to provide a lamp of high quality coated electrostatically with powder.

According to the invention, this object is achieved in a lamp of the kind described in the opening paragraph in that the powder layer contains as an addition magnesium oxide.

The presence of magnesium oxide in a powder layer containing cadmium pigment reduces the discolouring of the layer. With an addition of 3 to 7 parts by weight thereof to 100 parts by weight of the other constituents of the powder, the discolouring has been effectively suppressed. In general, the use of about 5 parts by weight per 100 parts by weight of the other constituents is sufficient to prevent the discolouring entirely or substantially entirely.

The light source of the lamp may be a filament, but may alternatively be a high-pressure discharge arc.

In incandescent lamps, the life was found to be considerably lengthened due to the presence of magnesium oxide as an addition in the powder layer. The powder layer comprises besides magnesium oxide at least one light-scattering substance. However, moreover a pigment may be present which may contain cadmium. The quanity of magnesium oxide required for a maximum effect on the life of an incandescent lamp depends upon the moisture content of the electrostatic powder layer. In general, 3 to 10 parts by weight of magnesium oxide per 100 parts by weight of the other constituents of the powder are sufficient. The powder layer will generally contain about 5 parts by weight of magnesium oxide per 100 parts by weight of the other constituents.

An embodiment of the lamp according to the invention is shown in the drawing in a side elevation partly broken away.

In the Figure, the lamp vessel 1 of bright glass sealed in a vacuum-tight manner has at its inner surface an electrostatically applied powder layer 2. A filament 3 is arranged in the lamp vessel 1 and is connected to current supply conductors 4 which are passed through the wall of the lamp vessel to the outside and are connected to a lamp cap 5. The lamp vessel 1 is fused at the end at which the lamp cap 5 is provided to a tube 6 (stem tube) which tapers and extends in the lamp vessel. With the use of cadmium-containing pigments in the powder layer 2, the fusion of the tube 6 to the lamp vessel 1 may lead to a discolouring of the powder layer in the proximity of the fusion area.

Examples of the composition of the powder layer in the lamp according to the invention are (quantities in parts by weight):

1)	cadmium sulphoselenide	40
	titanium oxide	5
	hydrophobic SiO_2	18 (resistivity about $10^{14}\ \Omega$)
	hydrophilic SiO_2	37 (resistivity about $10^{7}\ \Omega$)
	MgO	5.
2)	cadmium sulphide	20
	nickel titanate	20
	hydrophobic SiO_2	20
	hydrophilic SiO_2	40
	MgO	4.
3)	cadmium sulphoselenide	20
	iron oxide red	20
	hydrophobic SiO_2	20
	hydrophilic SiO_2	40
	MgO	5.
4)	in a first layer on the wall of the lamp vessel	
	cadmium sulphoselenide	40
	hydrophobic SiO_2	20
	hydrophilic SiO_2	40
	MgO	7
	and in a second layer provided over the first layer	
	hydrophobic SiO_2	50
	hydrophilic SiO_2	50
	MgO	7.
5)	hydrophobic SiO_2	45.45
	hydrophilic SiO_2	45.45
	titanium dioxide	9.1
	MgO	5.

In the lamps according to Example 4, the first layer can be much thinner than the layer according to Examples 1 and 2 and nevertheless the same colour satiration of the emitted light can be obtained.

The powder mixtures were obtained by mixing powders of the constituents in dry state. This has the advantage that no liquids are used and consumed so that environmental pollution and energy consumption for drying the mixture are avoided.

The lamps were manufactured in a flow of nitrogen. A positive pontential of 12 kV with respect to the powder mixture to be applied was given to the lamp vessel. The lamp vessel was fused to a stem tube provided with a gas filling or evacuated and then sealed. No or substantially no discolouring of the powder layer could be observed.

The Table indicates results of life tests carried out on 40 W, 230 V vacuum incandescent lamps of the kind shown in the drawing. The Table also states whether a mixture of zirconium and aluminium as a water getter is present (+) or is not present (-) on a current supply wire in the lamp. The lamps were operated in the bare state or in a hot fitting (a luminaire open only on the lower side) at 105% and 100%, respectively, of the nominal voltage (Vn).

Table

Lamps	coating example	Zr Al	V (% of V_n)	life (hr)
1	1	-	100	1423
2	1	+	100	1379
3	1 - MgO	-	100	964
4	5	-	105	1663
5	5	+	105	1467
6	5 - MgO	-	105	505

It appears from the Table that the lamps 1 having a red electrostatically applied powder layer according to Example 1 have a considerably longer life than the lamps 3, whose powder layer does not contain magnesium oxide. The presence of a mixture of zirconium and aluminium in lamps 2 does not exert an additional effect.

It further appears that the lamps 4 provided with a white electrostatically applied powder layer according to Example 5 have a considerably longer life than the lamps 6 which do not contain MgO in the powder layer. In the lamps 5, the mixture of zirconium and aluminium does not exert an additional effect either.

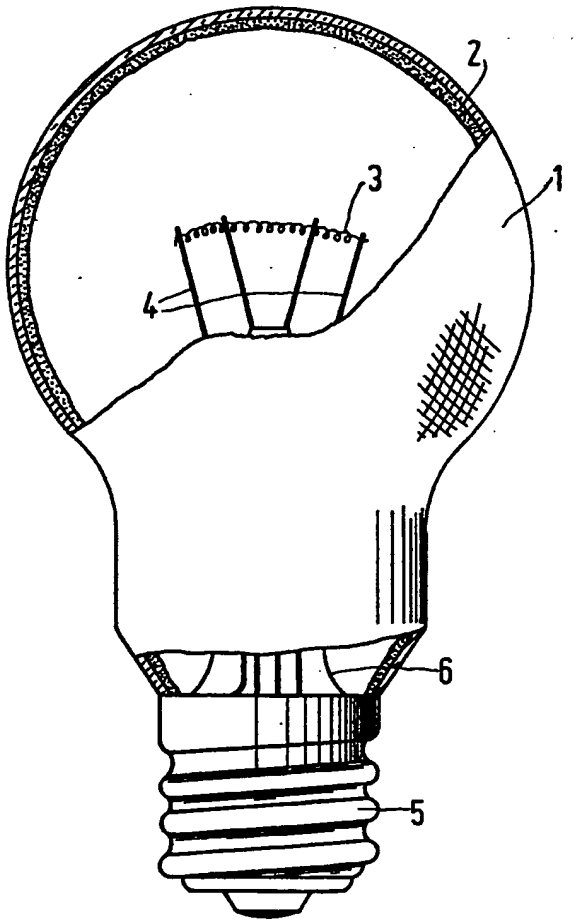
In the lamps 1 and 2, no local discolouring of the powder layer containing cadmium pigment was observed, this in contrast with the lamps 3.

Claims

1. An electric lamp having a glass lamp vessel which is sealed in a gas-tight manner and in which a light source is arranged, which is connected to current supply conductors which are passed through the wall of the lamp vessel to the outwide, this lamp vessel having at its inner surface an electrostatically applied powder layer which comprises a light-scattering powder, characterized in that the powder layer containes magnesium oxide as an addition.

2. An electric lamp as claimed in Claim 1, characterized in that the light source is an incandescent body.

3. An electric lamp as claimed in Claim 1 or 2, characterized in that the powder layer contains a cadmium compound as a pigment.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EUROPEAN SEARCH REPORT

Application number

EP 86 20 0141

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
D,A	EP-A-0 116 994 (PHILIPS) * Page 4, line 4 - page 5, line 28 *	1-3	H 01 K 1/32 H 01 J 61/40
A	EP-A-0 118 962 (PHILIPS) * Page 4, line 11 - page 5, line 22 *	1-3	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

H 01 J 61/00
H 01 K 1/00
H 01 K 3/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14-05-1986	SARNEEL A.P.T.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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